United States Department of Agriculture | Forest Service | Southwestern Region Forest Health Arizona Zone Office | 2500 S. Pine Knoll Drive Flagstaff, AZ 86001-6381 FAX (928) 556-2130 Voice (928) 556-2073

File Code: 3420 **Date:** December 5, 2006
Route To:

Subject: Spruce Beetle at Snowbowl Ski Area (peaksrd)

To: District Ranger, Peaks RD, Coconino NF

We (Arizona Zone of Forest Health Protection) have been working with your staff, Patty Ringle and Jim Rolf (retired), regarding spruce beetle activity and suppression treatments at the Arizona Snowbowl Ski Area over the last six years. This letter summarizes the results of suppression treatments and observations regarding spruce beetle activity in this area. I provide a background of spruce beetle activity, a description of past and present suppression actions, and a discussion of possible future actions.

Background

In the fall of 1999, a windstorm caused damage to spruce-fir stands on the San Francisco Peaks. The majority of this damage (windthrow or blowdown) occurred across 25 acres within the Snowbowl Ski permit area. Spruce beetle is well known to infest windthrown trees (Holsten *et al*., 1999). Surveys in 2000 and 2001 indicated spruce beetle activity had occurred in essentially all the wind-thrown spruce.

Several standing infested spruce were found during a survey in the fall of 2001. A total of 161 infested spruce trees were tallied within the storm-damage area adjacent to the chairlift below Midway. These findings indicated that some of the brood developed and emerged within a one-year time span. At this time, most of the infested trees were limited to within the areas of blowdown; that is, beetles had not yet expanded to adjacent stands.

Based on walk-through surveys, stands adjacent to the blowdown area seemed to be at moderate-high to high risk. There were numerous spruce trees greater than 16 inches diameter at breast height, and spruce composition and basal areas were high. This combination of stand characteristics and increasing beetle populations indicated that an outbreak was likely.

Past suppression efforts and current situation

2001. In 2001, the Peaks RD contracted with the Coconino Rural Environment Corps (CREC) to begin treating infested windthrown trees by limbing, bucking, and scorching the outer bark with torches. Due to the narrow window of favorable weather to complete this treatment, only a small percentage of the host material was treated.

2002. More than 700 infested spruce trees and new areas of blowdown were identified in late summer of 2002. In addition to surveying within the permit area, we ran a two-chain wide survey along the Kachina Wilderness boundary adjacent to the Upper Ridge ski run (W1 in ***Figure 2***). Only eight infested spruce trees were found in approximately 8 acres surveyed, indicating that most of the infestation was still limited to the permit area. In 2002, the District contracted CREC to treat standing infested trees by felling and bark peeling through the use of a

"log wizard." Removing the bark causes developing brood to desiccate and die. The use of a log wizard permitted a wider window of opportunity for treatment compared with burning. However, because of delays in funding, chainsaw restrictions and forest closures, treatments did not begin until August and only approximately 150 trees were felled and peeled. Forested areas C, E, F, and G were partially or completely treated.

2003. In 2003, the Peaks RD again contracted CREC to treat standing infested trees by felling and peeling through the use of a log wizard. Approximately 330 trees were felled and peeled during the summer of 2003 in forested areas A, C, and F. Funding delays and chainsaw restrictions due to fire risk prevented the felling and peeling treatments from starting until late July, and weather delays prevented the completion of treatments. In addition, infested trees adjacent to the Agassiz Chair Lift were not felled because of the risk to damaging the lift. Thus, some spruce beetle emerged from previously infested trees before treatments took place, and not all infested trees were treated. In August 2003, personnel from our office identified 289 newly infested spruce trees within forest areas A, C, and F. Limited resources and time prevented other areas from being surveyed at that time. In addition to the peeling treatment, the anti-aggregation pheromone for spruce beetle, MCH, was deployed on approximately 50 acres within forested areas A, B, C, H, and W1 during May and June 2003.

2004. In 2004, the Peaks RD contracted CREC to create trap trees, treat standing infested trees by felling and peeling, and deploy MCH bubble capsules. Because infested trees near the chairlift were not felled and because several factors have prevented infested trees from being treated prior to beetle emergence in past years, the additional treatment of using trap trees was implemented. Trap trees are uninfested trees with a diameter at breast height (DBH) greater than 12 inches that are felled before beetle flight initiates in the early summer (Holsten *et al*., 1999). Trap trees can absorb up to 10 times the number of spruce beetles that a standing tree will absorb and can help to suppress increasing spruce beetle populations (Bentz and Munson, 2000). In May 2004, 12 clusters of five trap trees (60 trap trees in total) were created by selecting uninfested spruce trees within in designated areas. The 60 trap trees plus 87 current infested trees were felled and peeled by CREC crews in forested areas A (only 5 of 18 trees treated), C, F, G and I, and an additional 18 trees were felled and peeled along the Agassiz Chair Lift with the assistance of Arizona Snowbowl staff. In addition, all stumps were peeled as they can harbor large numbers of spruce beetle. The combination of treatments reduced new attacks within forested areas by approximately 75 percent and the spruce beetle population as a whole appeared to be diminished within the Arizona Snowbowl permit area.

2005. In 2005, similar treatments were implemented using the CREC crew; however, instead of using trap trees, Lindgren funnel traps (Lindgren 1983) were placed within forested islands F, G, and I. These traps were used to monitor the timing of spruce beetle flight and collect emerging beetles from trees not treated in the previous year. Traps were hung on string between old infested trees (***Figure 1***) to minimize the amount of spillover (term used to describe beetle-attacked trees adjacent to baited pheromone traps). A total of 51 beetle-infested spruce trees were treated by feeling and peeling in September 2005.

Figure 1. *Funnel tap hung between old infested trees at Snowbowl.*

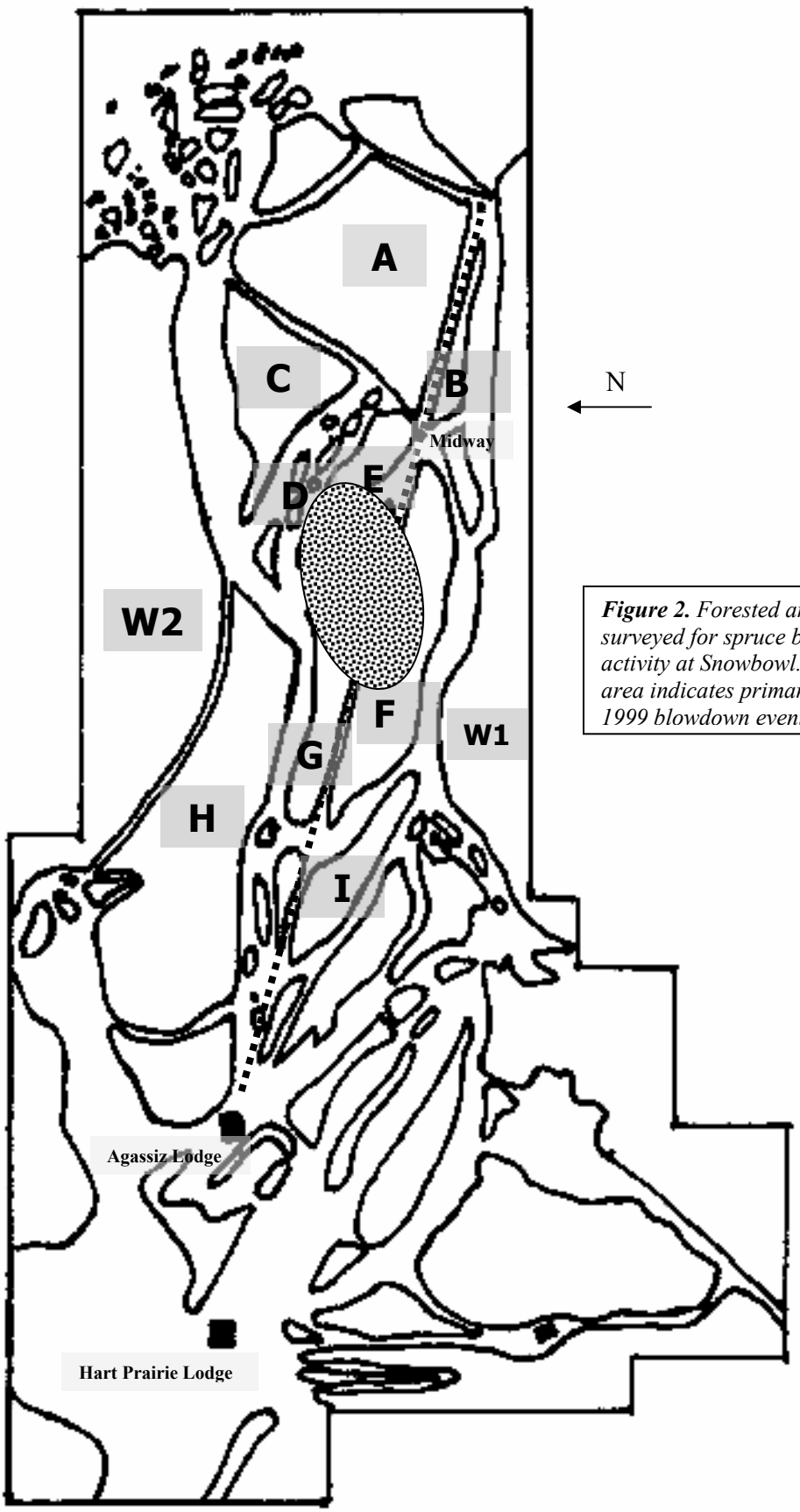

Figure 2. *Forested areas surveyed for spruce beetle activity at Snowbowl. Stippled area indicates primary area of 1999 blowdown event.*

2006. In 2006, similar treatments (MCH, felling & peeling of infested trees) and beetle flight monitoring (funnel traps) were implemented using the CREC crew. Forested islands A, B, C, D, E, F, G, and I were treated using MCH. This was the first year that E, F, G, and I were treated with the anti-aggregation pheromone. A total of 18 infested trees were identified, cut, and peeled in these areas (***Table 1***). Most of this mortality (83 percent) occurred in areas originally impacted by the 1999 blowdown event (E, F, and G).

Ten pairs of funnel traps were placed along the Boo Boo, Bambi, and Lodge Run ski trails north and south of forested island H in stands that were predominately corkbark fir and aspen. These areas were selected for trap placement to minimize the potential for spillover-attacks and to use a location that was more distant from the MCH treatments. All spillover trees within 150 foot radius of traps were identified, felled, and peeled in October 2006. A total of 17 spillover trees were treated by peeling of which only 5 trees were greater than 10 inches DBH.

Table 1. *Number of spruce beetle-infested trees and average diameter at breast height within forested islands at Snowbowl Ski area identified in October 2006. Forested islands without any new mortality are omitted. See Figure 2 for location of survey areas.*

	A	E & G	F	TOTAL
Average DBH	14.7	11.8	14.2	13.6
Number of trees	3	10	5	18

Future situation and recommendations

The combination of MCH and infested tree treatments seems to have reduced the spruce beetle infestation. In fact, the number of currently infested trees identified in October 2006 suggests that spruce beetle populations are now at an endemic level. Therefore, I do not recommend additional MCH or individual infested tree treatments. If any obligated CREC funds remain, they could be used to conduct a final survey for current infested trees in September/October 2007, in particular forested islands E, F, G, and I.

If you have any questions regarding my assessment of current bark beetle activities within the project area, its potential effect on residual standing trees, or my recommendations, please let me know. I can be reached at (928) 556-2074.

/s/ Joel D. McMillin
JOEL D. McMILLIN
Entomologist, Forest Health, Arizona Zone

cc: Patricia Ringle
Andrew J Stevenson
John Anhold
Debra Allen-Reid
Gilbert Zepeda

Mailroom R3 Coconino
Gene Waldrip

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